

## WHAT IS CLAIMED IS:

1. A message relay device connected with a plurality of routing processing devices for carrying out connection-less communications, for relaying a message from one routing processing device to another routing processing device, the message relay device comprising:

a plurality of interface units provided in correspondence to the routing processing devices; and

a switching unit connecting the plurality of interface units within the message relay device using optical rings capable of transmitting optical signals in a plurality of wavelengths by multiplexing the optical signals;

wherein each interface unit transmits an input message entered from a corresponding routing processing device of each interface unit, through a communication channel in the optical rings toward a target interface corresponding to a relaying target routing processing device of the input message which is formed by using a wavelength determined according to the input message, and receives an output message to be outputted to the corresponding routing processing device of each interface unit from the switching unit by selectively intercepting a wavelength uniquely allocated to each interface unit in the optical rings, where a number of wavelengths that can be received at each interface unit is set to be greater than a number of wavelengths that can be transmitted from each interface unit.

2. A message relaying method by a message relay device, connected with a plurality of routing processing devices for carrying out connection-less communications, and having a plurality of interface units provided in correspondence to the routing processing devices and a switching unit connecting the plurality of interface units within the message relay device, for relaying a message from one routing processing device to another routing processing device, the message relaying method comprising:

commanding the switching unit to set up a bypass communication channel within the message relay device in correspondence to an internal identifier which is an identifier defined within the message relay device for identifying at least a target

interface unit corresponding to a relaying target routing processing device of each message;

at each interface unit, determining a flow to which an input message entered from a corresponding routing processing device of each interface unit belongs and assigning the internal identifier to the input message according to the flow, transmitting the input message to the switching unit, and receiving an output message to be outputted to the corresponding routing processing device of each interface unit from the switching unit; and

at the switching unit, internally setting up the bypass communication channel according to the internal identifier in response to a command from the commanding step, and internally switching messages transmitted from one interface unit to another interface unit using the bypass communication channel.

3. A message relaying method by a message relay device, connected with a plurality of routing processing devices for carrying out connection-less communications, and having a plurality of interface units provided in correspondence to the routing processing devices and a switching unit connecting the plurality of interface units within the message relay device, for relaying a message from one routing processing device to another routing processing device, the message relaying method comprising:

at each interface unit, checking an input message entered from a corresponding routing processing device of each interface unit according to a protocol used in the input message, assigning to the input message an internal identifier which is an identifier defined within the message relay device for identifying at least a target interface unit corresponding to a relaying target routing processing device of the input message, storing the input message in a buffer until a bypass communication channel within the switching unit from each interface unit toward another interface unit which is capable of transmitting messages assigned with the internal identifier becomes available at the switching unit, transmitting the input message stored in the buffer to the switching unit while maintaining a protocol format of the input message as entered, and receiving an output message to be outputted to the corresponding routing processing device of each interface unit from the switching unit; and

at the switching unit, internally switching messages transmitted from one interface unit to another interface unit using the bypass communication channel.

4. A message relaying method by a message relay device, connected with a plurality of routing processing devices for carrying out connection-less communications, and having a plurality of interface units provided in correspondence to the routing processing devices and a switching unit connecting the plurality of interface units within the message relay device using optical rings capable of transmitting optical signals in a plurality of wavelengths by multiplexing the optical signals, for relaying a message from one routing processing device to another routing processing device, the message relaying method comprising:

at each interface unit, transmitting an input message entered from a corresponding routing processing device of each interface unit, through a communication channel in the optical rings toward a target interface corresponding to a relaying target routing processing device of the input message which is formed by using a wavelength determined according to the input message, receiving an output message to be outputted to the corresponding routing processing device of each interface unit from the switching unit by selectively intercepting a wavelength uniquely allocated to each interface unit in the optical rings, and processing an intercepted message intercepted by selectively intercepting a wavelength commonly allocated to the plurality of interface units in the optical rings, according to information indicating an interface unit which is a destination of the intercepted message.